REMARKS

Claims 1-5, 7-8, 11, 14, 21-23, 25, and 27-28, all the claims pending in the application, stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

I. The Prior Art Rejections

Claims 1-8, 10-11, 13-14, and 21-28 stand rejected under 35 U.S.C. §102(b) as being anticipated by Cantell, et al. (U.S. Patent No. 6,184,134), hereinafter referred to as Cantell. Claims 1, 3-8, 13-14, and 21-28 stand rejected under 35 U.S.C. §102(b) as being anticipated by Hirose, et al. (U.S. Patent No. 5,990,005), hereinafter referred to as Hirose. Applicants respectfully traverse these rejections based on the following discussion.

The claimed invention provides a system for forming a silicide on a silicon material. Specifically, the system includes a metal formation tool and a heated chuck comprising a resistive heater, wherein the metal formation tool and the heated chuck are in the same chamber. Such features are not taught by the prior art of record. Instead, the heater 6 of Hirose is provided on the top surface or a main surface of the silicon substrate and a Peltier cooling system 7 is provided below the silicon substrate; thus, the heater 6 does not teach or suggest the claimed "heated chuck". Moreover, the heater 6 is in the reflow chamber 4, which is separate from the sputter chamber 2. In regards to Cantell, the heating chamber 30 does not include a heated chuck comprising a resistive heater. In addition, Applicants submit that neither Cantell nor Hirose teach a second heating tool or a third vacuum chamber outside of first and second vacuum chambers. Therefore, as

explained in greater detail below, Applicants respectfully submit that the prior art of record does not teach or suggest the claimed invention.

Applicants traverse the rejections because the cited prior art fails to teach a heated chuck comprising a resistive heater. Such a feature is defined in independent claims 1 and 23 using similar language.

The Office Action argues that the pedestal 16, 14 of Cantell is a heated chuck; and, that the "pedestal 16, 14 is connected to *an RF generator (20, 18) which, can serve to heat the chuck*" (Office Action, p. 3, para. 3 (emphasis added)). However, Applicants submit that there is absolutely no support within Cantell to maintain the Office Action's assertion. Specifically, Cantell merely discloses that "[a] matching network 20 and RF generator 18 is preferably connected to shaft 16 of pedestal 14" (Cantell, col. 4, lines 65-67).

Nevertheless, contrary to the position taken in the Office Action, nothing within Cantell discloses a device element that "can serve to heat the chuck", including the matching network 20 and the RF generator 18. In fact, other than FIG. 1 and the portion of Cantell cited above, there is no other mention of the matching network 20 or the RF generator 18.

From the limited disclosure relating to the matching network 20 and RF generator 18, it appears that such components are merely utilized to create plasma in the cleaning chamber 10. However, nothing within Cantell teaches that the matching network 20 and/or the RF generator 18 can be utilized to heat the chuck.

Furthermore, Applicants submit that Hirose does not disclose a heating tool comprising a heated chuck, wherein the heated chuck comprises a resistive heater. Rather, as provided in column 14, lines 40-47 of Hirose, a heater 6 is provided on the *top* surface or a main surface of the silicon substrate 1. The heater 6 may comprise either a normal heater which generates heat or a halogen lamp which projects a light onto the substrate 1. It is possible that the halogen lamp is provided outside the chamber 4 so as to project a light onto the substrate 1 from the exterior of the chamber 4.

Moreover, as illustrated in FIG. 1, the heater 6 is not a chuck within the reflow chamber 4 that is adapted to hold the silicon substrate 1. Rather, a Peltier cooling system 7 is provided below the silicon substrate 1. As discussed in column 14, lines 36-40, the substrate 1 has been moved from the sputter chamber 2 into the reflow chamber 4 and then placed on the Peltier cooling system 7 so that the bottom surface of the silicon substrate 1 is made into contact with the Peltier cooling system 7.

Therefore, it is Applicants' position that neither Cantell nor Hirose teach the claimed feature of "a heating tool ... compris[ing] a heated chuck ... wherein said heated chuck comprises a resistive heater" as defined by independent claims 1 and 23. As discussed above, the matching network 20 and/or the RF generator 18 of Cantell are not resistive heaters. In regards to Hirose, the heater 6 is provided on the top surface or a main surface of the silicon substrate; thus, the heater 6 is not a chuck positioned below the substrate for holding the substrate. Instead "the Peltier cooling system 7 is provided below the silicon substrate 1".

In addition, Applicants submit that neither Cantell nor Hirose teach a heated chuck comprising a resistive heater and a metal formation tool that are in the same chamber. Such features are defined in independent claim 23 using similar language. Additionally, independent claims 1 and 8 define "a metal formation tool within said vacuum chamber and ... a heating tool within said vacuum chamber". As further illustrated in FIG. 2 of Applicants' disclosure, a heated chuck 216 and a metal formation tool 206 are illustrated in the same chamber (i.e., the vacuum chamber 202).

As more fully described above, neither Cantell nor Hirose disclose a heated chuck comprising a resistive heater. Although the Office Action argues that the cleaning chamber 10 includes a pedestal 16, 14, nothing within Cantell discloses that the pedestal 16, 14 is a heated chuck. Only a matching network 20 and an RF generator 18 are connected to the pedestal 16, 14; and neither the matching network 20 nor the RF generator 18 are resistive heaters.

At any rate, metal deposition is performed in the chamber 30, not the cleaning chamber 10. As described in column 5, lines 21-26, after cleaning, wafer 12 is transferred to chamber 30. Once wafer 12 is positioned in chamber 30, wafer 12 will preferably undergo a cobalt deposition process or optionally, a titanium nitride deposition process.

However, nothing within Cantell teaches or suggests that the pedestal 34, 36 of chamber 30 is a heated chuck. Rather, the only mention of the pedestal 34, 36 in Cantell merely discloses that "[a] pedestal 34 (typically made of stainless 67steel) is disposed on a vertical shaft 36 (typically made of stainless steel). Substrate 12, on which cobalt is to

be deposited, is positioned and secured on pedestal 34" (col. 5, lines 3-7). Therefore, nothing within Cantell discloses a heated chuck and a metal formation tool in the same chamber as defined by independent claims 1, 8, and 23.

Furthermore, FIG. 1 of Hirose illustrates that the heater 6 is in the reflow chamber 4 and not within the sputter chamber 2. Therefore, the heater and metal formation tool are in separate chambers.

FIG. 2 illustrates a sputter chamber 8; however, the sputter chamber 8 does not include a heated chuck adapted to hold a silicon material, wherein the heated chuck comprises a resistive heater. Instead, a heater positioned above the silicon material is used to heat a top surface of the silicon material. A chuck below the silicon material is not used to heat the silicon material.

More specifically, as discussed in column 16, lines 33-44 of Hirose, the radio frequency signals applied to the stripe electrode 11 causes the density of plasma to be increased so that a high density plasma attacks to the surface of the silicon substrate 1. As a result, *only a top surface region of the silicon substrate 1 is heated* up by the high density plasma whereby a temperature of the top surface region of the silicon substrate 1 is resin up to about 450° C whilst *the bottom surface of the silicon substrate 1 has a lower temperature by not less than 50° C* as compared to the temperature of the top surface region of the silicon substrate 1. Namely, the bottom surface of *the silicon substrate 1 is maintained at a low temperature* of not more than 400° C.

Therefore, the sputter chamber 8 does not include a metal formation tool and a heated chuck adapted to hold the silicon material, wherein the heated chuck comprises a

resistive heater. Rather, the sputter chamber 8 only includes a heater positioned above the silicon material to heat only a top surface of the silicon material, wherein the bottom of the silicon material is maintained at a low temperature.

Accordingly, Applicants respectfully submit that neither Cantell nor Hirose teach the claimed feature of a heated chuck comprising a resistive heater and a metal formation tool that are in the same chamber (independent claims 1, 8, and 23). Instead, the heating chamber 30 of Cantell does not include a heated chuck adapted to hold the silicon substrate, wherein the heated chuck comprises a resistive heater. Moreover, in regards to Hirose, the heater 6 is in the reflow chamber 4, which is separate from the sputter chamber 2.

In addition, Applicants submit that neither Cantell nor Hirose teach a second heating tool external to the vacuum chamber. Such features are defined in independent claims 8 and 23 using similar language. As discussed in paragraph 0009 of Applicants' disclosure, the system can include a second heating tool (possibly external to the vacuum chamber) that is adapted to heat the silicon material after the silicon material is removed from the vacuum chamber and after it undergoes the etching process. This second heating tool is adapted to heat the silicon material to temperatures above 600° C to form a disilicide.

Cantell discloses a chamber 30 for heating the substrate 12; and, Hirose discloses a heater 6 for heating the substrate 1. However, nothing within Cantell and Hirose teaches a second heating tool. In fact, the Office Action does not assert that such a feature is disclosed in the prior art.

Therefore, Applicants respectfully submit that neither Cantell nor Hirose teach the claimed feature of "a second heating tool external to said vacuum chamber" as defined by independent claims 8 and 23.

The Office Action argues that Hirose and Cantell disclose a third vacuum chamber outside of the first and second vacuum chambers (Office Action, p. 4, para. 2). Such features are defined in dependent claims 4, 21, 22, and 28 using the following language: a "third vacuum chamber [is] adapted to maintain said vacuum environment while transporting said silicon material from said first vacuum chamber to said second vacuum chamber" "wherein said first vacuum chamber and said second vacuum chamber are outside of said third vacuum chamber".

However, the Office Action fails to identify the device element(s) within Hirose and Cantell, which assertedly teach the third vacuum chamber of the claimed invention. The Office Action argues that both Hirose and Cantell teach a transfer means between the two primary vacuum chambers in which the vacuum is maintained. In regards to Hirose, the "transfer means" appears to be the gate valve 5; and, in regards to Cantell, the "transfer means" appears to be the mainframe 50. However, there is absolutely nothing within Hirose to teach or suggest that the gate valve 5 is a vacuum chamber. As such, to suggest that the gate valve 5 is a vacuum chamber would render the claim language meaningless.

Instead, Hirose only discloses, in column 14, lines 27-30, that a gate valve 5 is provided between the sputter chamber 2 to the reflow chamber 4 so that a reaction in the sputter chamber 2 is separated from a reaction in the reflow chamber 4. Moreover, as

discussed in column 15, lines 9-13. the reflow chamber 4 is separated by the gate valve 5 from the sputtering chamber 2 to prevent any interference between them except when the substrate 1 is moved from the sputtering chamber 2 into the reflow chamber 4. Hirose makes no other mention of the gate valve.

Therefore, it is Applicants' position that Hirose fails to teach the claimed feature of a "third vacuum chamber ... adapted to maintain said vacuum environment while transporting said silicon material from said first vacuum chamber to said second vacuum chamber" as defined by independent claims 4, 22, and 28.

In regards to the mainframe 50 of Cantell, FIG. 1 clearly illustrates that the vacuum chambers 10 and 30 are *inside* of the mainframe 50. Further, as discussed in column 4, lines 49-51, the mainframe 50 may have one or more chambers, such as cleaning chamber 10 and cobalt deposition chamber 30, integrated *within* mainframe 50. Therefore, Cantell fails to teach the claimed feature "wherein said first vacuum chamber and said second vacuum chamber are *outside* of said third vacuum chamber" (emphasis added) as defined by dependent claims 21, 22, and 28.

Therefore, it is Applicants' position that Cantell and Hirose do not teach many features defined by independent claims 1, 8, and 23, and that such claims are patentable over the prior art of record. Further, it is Applicants' position that dependent claims 2-5, 7, 11, 14, 21-22, 25, and 27-28 are similarly patentable, not only because of their dependency from a patentable independent claims, but also because of the additional features of the invention they defined. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

II. Formal Matters and Conclusion

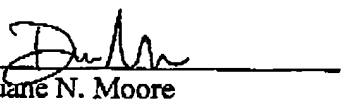
With respect to the rejections to the claims, the claims have been amended, above, to overcome these rejections. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections to the claims.

In view of the foregoing, Applicants submit that claims 1-5, 7-8, 11, 14, 21-23, 25, and 27-28, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,

Dated: 9/28/06



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